

Market Hunt Season 2 Episode 6, Darwin AI transcript

[Intro music]

Thierry Harris: The promise of Artificial intelligence seems to be infinite. But AI companies are just like everyone else. They need to find markets for their products and services, and customers willing to pay for them.

Sheldon Fernandez: The big thing with artificial intelligence and you see this throughout the industry, there's a real chasm between scholarship that will be published at a conference and product that the enterprise can use to solve a business problem.

Thierry Harris: It's been said Artificial Intelligence is at the stage where the Internet was in the early 90s. The strong winds of Machine learning technology are blowing apart old ways of doing things. New opportunities breed new challenges. Whether we are ready for it or not, AI powered technology is becoming more and more present in our lives.

In the first episode of Market Hunt's AI Series, we go deep into a concept called AI explainability. You'll hear from a Waterloo based company working towards making AI more predictable, transparent and traceable.

We'll examine different AI business models, understanding the difference from being an AI product company versus an AI consulting company.

We'll also discuss Canada's need for a large-scale multinational to help drive innovation and finally we'll talk about ethics in AI and what lies ahead for the technology's market adoption. Stay tuned.

[intro song music]

Nick Quain: Entrepreneurship is hard, you need to have support there.

Andrew Casey: We fundamentally have to learn how to live our lives differently. We can't keep going the way we have.

Thierry Harris: Do you think we can we ever get to that point where AI that's going to us explain baby talk, or cat talk and dog talk. Is that ever going to happen ?

Rune Kongshaug: I fall in love, easily.

Thierry Harris: True. We're coming up with some pretty interesting ideas here.

Andrew Casey: We've solved everything,

Thierry Harris: [chuckles] We've solved it all.

[End intro song]

[begin promo music]

Narrator: And now a message from our sponsor, [IE-KnowledgeHub](#).

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le-KnowledgeHub focuses on innovation ecosystems and firms who commercialize their technologies in international markets.

Let's listen in to a Video Case Study featuring [Cogiscan](#).

François Monette: *The manufacturing industry is all about building the best possible product at the lowest possible cost. You know there is always a lot of pressure on that especially in electronics. In a typical circuit board, maybe 80 percent of the costs of the product, of the finished product is the sum of all the components. If we can manage these components you know very precisely, eliminate human errors and reduce waste in general. There is a great great savings there just on that materials management part of it.*

Narrator: *That's François Monette, Co-founder of Cogiscan. Cogiscan's software tracks, traces and controls the raw components that go into making electronic circuit boards. He and his co-founders, André Corriveau and Vincent Dubois founded the company over twenty years ago. When they started the market wasn't ready for their technology. But with the advent of electronics chips everywhere, Cogiscan knew it would become essential to electronics manufacturing.*

François Monette: *It's not a matter of if things will happen, it's a matter of when and how big the problem will be. You've seen that with a lot of automotive recalls recently, if there is a defect in the end product and then the manufacturing needs to make a recall on the market. He wants to minimize the impact of that recall, so he needs to know precisely what units were affected. A lot of time a lot of products nowadays, especially expensive products are all serialized. So they know exactly which unit was shipped to which customer. Our job is to tell them how each one of*

these individual units was produced. So if the defect is connected to a specific component or a sub-assembly of that product. We are able to tell them exactly which serial numbers of units are affected and which ones need to be recalled.

Narrator: *Being a small SME meant relying heavily on partnerships with larger industry players. Cogiscan identified an opportunity in their market to connect manufacturing machines to software. They established themselves as a connectivity company, bridging various machines and enterprise systems to speak to each other. Vincent Dubois elaborates on their approach.*

Vincent Dubois: *One of our strengths is really you know the human approach that we have. And I mean we have customers that were with us since day 1, and still are here today and we are not just supplier and customer. We are friends. You know at the end of the day, we meet with them. So we want to be viewed as the partner of choice. and that's not just the technology, it's the people behind it who are making it happen.*

Narrator: *Listen to more from Cogiscan at the end of the show. You can also checkout the Cogiscan video case study at [IE hyphen Knowledgehub dot ca](https://iehyphen.com/knowledgehub).*

Thierry Harris: In order for people to trust AI, they need to understand how it works. In other words how did the AI algorithm come to its conclusion to provide an answer to a problem? It might seem obvious to the uninitiated, but many algorithms used for machine learning are not able to be examined after the fact. This means engineers don't understand why a computer came to a conclusion. The process to understand how an AI powered machine works is called AI explainability. AI explainability aims to make black box artificial intelligence solutions more predictable, more traceable and more transparent.

Transparency in AI might not be so important for things such as product recommendations when you are browsing a website. But in other instances, such as defence systems applications, or medical diagnoses it could be crucial to understand why and how an AI technology came to its conclusion.

Waterloo's [Darwin AI](#), sown from the seeds of the [University of Waterloo](#), seeks to address this explainability problem. I spoke with [Sheldon Fernandez](#), the company's CEO back in February 2021. Let's listen in to the conversation beginning with the notion of explainability which for Sheldon has become very personal.

Sheldon Fernandez: I say sometimes I need explainability for my son because they don't have to understand what he's saying or what he's thinking. So I try to tackle that in parallel to, uh, to my day job.

Thierry Harris: Well, do you think we can ever get to that point where we're going to have AI? That's going to explain to us baby talk, or first those of us who have pets, cat talk and dog talk. Is that ever going to happen ?

Sheldon Fernandez: I mean, you know, never say never given how quickly AI has developed and what it's accomplished. Uh, it might not be in my lifetime or yours, but, uh, you never know.

Thierry Harris: Okay, well, we'll, we'll keep an eye on that.

Sheldon Fernandez: Yeah definitely.

Thierry Harris: Yeah. Great stuff. Okay. And maybe you can give us a bit of context about what is Darwin AI and what you're working on?

Sheldon Fernandez: Absolutely. So Darwin AI is I used to use the term startup. I don't anymore. We just turned four. We're an artificial intelligence company based out of Waterloo, Ontario. We are organically connected to the University of Waterloo. All the founders, including myself are Waterloo alumni. And two of our co-founders are professors at Waterloo, including professor Alexander Wong who's Canada's research chair in artificial intelligence.

And the fundamental problem that we are solving or rather have solved than are commercializing is what is known as the black box problem or the explainability problem in deep learning. And so just to quickly describe it, you know, machine learning and deep learning learn by looking at a tremendous amount of data. So prior to this second wave AI, let's call it, if you want it to get a machine, to do something, you programmed it with a human program or a group of human programmers who in very precise terms, describe, you know, the logic of the program.

And that's very powerful and that's what we use today. It's what we're using when we talk on Zoom, it's what you're using when you use Microsoft Word, but there are some problems that can not be described in simple rules. If you consider, for example, showing you know, a computer, a picture of a lion and having it determine if it's a lion prior to the advent of machine learning, that was a profoundly difficult problem.

Because if you think about all the variation that occurs in a picture of a lion, there's not a precise way to mathematically describe it. So what is very simple, my son can do it now at two and a half is in fact very, very difficult for a computer. What happened in the, you know, let's say starting in 2010 or so, because of the advent of cloud computing and social media, we suddenly had access to hundreds of thousands, if not millions of pictures of lions that were labeled.

And so what machine learning says is I will learn not by a human programmer. I will learn by looking at many, many examples of the particular tasks that you're trying to accomplish. And I will determine my own rules for how to determine, or rather carry out that task. But the problem that occurs, and this is what the black box problem is about is the human designers, who design these systems, don't understand how these systems have codified the data to come up with these rules. And so, although they can do all this powerful prediction, we have very little insight into how they're arriving at their conclusions. And that is the problem that our academics identified almost a decade ago. And it's what they spent many years developing scholarship around. It's what we've commercialized and brought to market.

[Music transition]

Thierry Harris: Darwin' AI platform is called General Synthesis or [Gensynth](#) for short. Some of the questions explainable AI seeks to answer include: why did the AI system make a specific prediction or decision? Why didn't the AI system do something else? When did the AI system succeed? And when did it fail? When do AI systems give enough confidence in the decision that you can trust it? And how can the AI system correct errors that arise?

I asked Sheldon to provide us with a few more examples of explainable AI.

[Music transition]

Sheldon Fernandez: Absolutely. So my favorite one, and I've given this one before is the purple sky problem. So we had an autonomous vehicle company. This would have been about 18 months ago that ran into a very strange situation where their car was turning left with increasing statistical frequency when the color of the sky was a certain shade of purple. And so just pause and think about that. The color of the sky is this shade of purple. The car starts turning left. Now we, as human beings know that that should not happen. The color of the sky in general should not dictate the way you turn. I mean, I suppose if there's a volcano on your right, you're going to turn left, but people get the point. So we used our technology and help them, you know, investigate the scenario. And it turned out that they had trained the AI for this particular turning scenario in the Nevada desert at the same time every day, when the color of the sky was this shade of purple.

And so this is what we call a nonsensical correlation. It is when the AI is assuming something from the data, because of course it's modeling the data, not the real world that it thinks makes sense, but is nonsensical to a human being. And so this really illustrates in my opinion, the profundity of the problem of explainability, because if you don't know how something works, you don't know when it'll fail. And if you don't know, when it will fail, there are all these edge cases in the system that have, are waiting to be realized with potentially disastrous consequences.

And so if we now think about some of the industries that we're working with auto, of course is one of them aerospace and defense is another, healthcare and pharma is another, the cost of getting something wrong in those situations is so catastrophic that the idea of having robustness and responsibility in these systems is very, very key and thus a major concern for a lot of a lot of these companies.

So that's a very poignant example that I can speak to. Um, another one I'll give you, that's a little more topical, is related to COVID-net. So when Corona became acute in Canada, this would have been March of last year, which I'm sure many of us remember. We actually used our own platform to develop a neural network called [COVID-net](#) that diagnosed as Corona based on chest x-rays and CT scans. And in the early days of designing the system, we looked at the data and we looked at what the AI was doing. And in certain cases it was not looking at the patient's lungs to find COVID. It was actually looking for the divot in the hospital bed when they would lie down, because the imprint of when somebody is lying down in the hospital bed is different apparently than a real bed.

And so that was a cue or a tell to the AI that somebody was in a hospital. And so this identifies the second problem we see with deep learning and machine learning in that sometimes the system will reach the right decision, but for the wrong reasons. And so being able to identify scenarios like this and remove them, through additional data or cleansing your data is very, very important in making the AI more robust. And so I hope those two examples kind of illustrate for your listeners the importance of this problem and why companies are so interested.

[Music transition]

Thierry Harris: So tell us a little bit about that journey in terms of bringing your product, which was really a development that started at the university with the foundational research, exploring the explainable AI and relating it to tangible problems that are out there in the universe. And how did you go from at first, what you called a POC, which was essentially a service model, if I'm not mistaken and then taking that into a licensing model that you're doing.

[Music transition]

Sheldon Fernandez: I had started enterprise software consulting company out of Waterloo when I graduated. Uh, it was a 15 year journey to build that company called Infusion. We went from the original four to 650, and we were acquired in 2017 by a much larger company called [Avanade](#). That's owned by Microsoft and Accenture. Uh, so I was in the process of being acquired. I was just thinking about what's next. And I was planning, you know, a long hiatus, like I think many of us would do. But a colleague introduced me to this academic team and I was just blown away by their IP and their strengths as researchers and knew I had to get involved. And I've always been traditionally very much on the technical side.

So I encountered very promising IP, but the big thing with artificial intelligence and you see this throughout the industry, there's a real chasm between scholarship that will be published at a conference like [CVPR](#) in Europe and product that the enterprise can use to solve a business problem. So when I got involved, I was originally advising this team. We went through the [Creative Destruction Lab](#) program or CDL as it's known here in Toronto, which is kind of like Canada's [Y Combinator](#). And that was extremely valuable because through that program, you meet hardened investors and entrepreneurs who are not intoxicated with the scientific, you know, cachet of what you're doing and will instead ask questions like: "OK, this is nice, but what are you actually solving?" I remember vividly an investor saying: "You know, Sheldon right now, this is a science project and a very impressive science project. How do you turn this into a business?"

So we then had to say, okay, like, we're solving this problem. What businesses will this matter to? We think it'll matter to businesses where trust and robustness is very important. Things like aerospace and finance. And so you start engaging these organizations through your network through CDL. And the first thing that they will do is if they see promise in your idea, they'll want you to prove it out. And so they'll want you to do, you know, what we term as a proof of concept or a very small paid engagement. And that's what we did with it, with a number of these organizations, to prove out the technology, you learn a tremendous amount through that process. Sometimes you learn, you're looking at a problem at a 45 degree angle and not the 90 degree angle. You need to be looking at it.

And it's through that journey that you figure out where the technology really manifests itself in a very powerful way where it's maybe not so applicable and you develop a product around that, which is what we did. And once they've seen the value through your, your services and your, and your POC, then they're very open to licensing it.

So it was a long journey. It's, it's, uh, you know, uh, we, we, we began Darwin in 2017 and I'll never forget when we finally deployed our first enterprise product to a client in Connecticut, it was very emotional moment for me because you realize, you know, how hard the journey is and how long we had to take it. And of course that was just one client to have many clients and build a business around, of course, that's the next step. But you know, that, that was the, the quick description of how we, how we underwent it.

[Music transition]

Thierry Harris: Well, I think it's a really an amazing journey and important to underscore all the sacrifices and hard work that it takes to take something out of a university lab and then into a commercial market. That's what we're all about. Talking here in Market Hunt is that commercialization of inventive ideas that turn into innovative products and services and Darwin AI is a perfect example of that.

What were some of your learnings along the way as you refined your customer demand? How, how were you able to do that in a way that made sense to the customer and also made sense for Darwin AI to make this a profitable business?

[Music transition]

Sheldon Fernandez: Yeah, great questions. You know what, one of the key questions you have to ask is you have to separate the hard problems from the valuable problems and they don't always overlap. And when you inherit an academic team like we did, you know, academics love the intellectual challenge of solving problems as do engineers, but the harder problem, again, isn't always the most valuable problem. And so that distinction is really important when you're starting a business. Sometimes the easy problem, the obvious problem is almost underwhelming intellectually, but is the one that you should be tackling.

So we really had to bring a certain level of discipline and look at use cases where a problem, an unsolved problem, had real commercial potential, uh, and a significant amount of, uh, you know, funding behind it.

You know, I remember one of our, one of our product advisors, you know, gave the distinction between a vitamin and a painkiller. And he says, you know, vitamin is something that you, you take and it's, it's additive and it's, it's augmenting it. And it's nice to have, but you don't have to have it. Whereas a painkiller, if you have a headache, you know, migraine, you are going to take it. You want to find pain in these organizations where if you solve that pain, it's a no brainer to buy your product. And when you, when you think about it and frame it that way, that is actually what helped guide us into some of the industries that we're working with now.

Thierry Harris: Well, it won't be the first time you hear this on Market Hunt in terms of finding pain in big and large organizations. We have another company, [Aeponyx](#) who was developing semiconductor switches, who used the exact same terminology, said find the pain points of these big companies, and then pick up your suitcase and then knock on their door and then articulate that pain point and then show how your service offering is going to help them, decrease that.

[Music transition]

Thierry Harris: So basically you have this Gensynth platform, and then what the difference is between the service model, where in the service model, that company is going to say, okay, I'm going to give you our data. And you can go ahead and plug that into your platform, and then you're going to be able to crunch some numbers and an output, a solution for us. Whereas when you're in the licensing model, you're just basically licensing access to the Gensynth platform. And then any company can then plug in their numeric data and also sort of explain the context of how that data is being framed, so to speak, and then they can pay you a licensing fee to be able to use that platform.

[Music transition]

Sheldon Fernandez: That's a good distinction. And I think it's a very important point for startups. Keep in mind. You know, you have to decide, are you a consulting company, or are you a product company? And you have to make that distinction clear when you begin the organization, and maintain that discipline. So we are a product company. That's how we measure success. If companies are licensing our platform. Now that said we do provide services, but they will be in, in support or in service of the platform.

So if a company comes to us and says, Darwin, AI, we need you to do X and you need to do it. That really doesn't work for us because, you know, we can't scale that with, with the size of our team. We, we will, we will point them to a partner who will use Gensynth and then they'll do the work, but we won't do it ourselves.

But there, there, there is a bit of push pull here because some of our clients are so new to deep learning and so new to artificial intelligence that you need to do a little bit of work to get them started. So we'll do that work if again, they they've committed to a license and, you know, we can teach them how to use the technology so that when we finished the engagement, they are using our platform and are sufficient and are proficient in it, um, apart from us. And so it's a fine line sometimes to maintain, especially as a startup, but it's a very important one that, you know, entrepreneurs need to think about when they're especially entering, you know, budding fields that, that enterprises are quite new to.

[Music transition]

Thierry Harris: A good follow up study could be to examine the conditions in which companies are able to productize their services to scale and become larger companies.

Canada is full of stories such as Darwin AI. Researchers working in universities who patent their technologies and partner with business people to commercialize their ideas into products and services, hunting for markets.

The country breeds thousands of startups, some of which turn into small and medium size businesses. These SMEs are often poached, along with their valuable IP assets by international multinationals for a variety of reasons.

I asked Sheldon what his thoughts were on whether we needed a large Canadian multinational to help support innovation and keep the IP in Canada.

[Music transition]

Sheldon Fernandez: Yeah, it's a, it's a fascinating question. And one I've thought about for a long time, you know, the, the, the market and the capitalistic system, if I can use that term is inherently darwinian to use a pun.

I think the challenge is that Canadian entrepreneurs need to think bigger, many are more than happy to bring a company to a certain size, let's call it 50 to a hundred million dollars and then be acquired and live a very comfortable life thereafter, which, which I can't argue against, because life is not just about, you know, the commercial endeavor. But what we need more of are the, you know, [Shopify's](#), the [Lightspeed's](#) and so forth that really bring a company to significant scale, because it's those lessons that are so important to fuel, you know, our economy moving forward.

And one of the, one of the knocks I often hear, about Canadians, you know, from Silicon Valley, because one of our investors is in there, and I've spent quite a bit of time there is that, you know, we don't dream big enough in Canada.

I was actually at a CEO summit, from one of our investors. And they had a guest speaker from, you know, one of the top five VCs in the Valley who implored Canadians to think larger. And he taught, he gave this example of, you know, he was being pitched by this group from Waterloo. Brilliant. He's like, you know, they were, they were 10 times smarter than, you know, similar groups from Stanford, from Berkeley, from Harvard. And I was completely with them. I was ready to invest and I get to their last slide and they're painting their addressable market and it's a hundred million dollars and he goes: "Right then I closed my notebook cause it's a non-starter." He goes "I want you guys thinking about billion dollar problems. I want to, I want you thinking about changing the world."

And so that's, I think the big challenge for Canada moving forward is to instill that Silicon Valley ethos in our, in our next wave of entrepreneurs. And I do think there's a lot of encouragement. You know, I was, as a matter of fact, right after this CEO summit that we did virtually, but primarily in Silicon Valley, in terms of contributors, I was on a similar, you know, CEO conversation that Creative Destruction Lab and the sophistication and the questions about scaling were almost equal. So we're getting there. And you see successes [ApplyBoard](#), for example, in Waterloo's doing really well. Um, there's a couple of other examples in Montreal. I'm sure I'm sure we could point to, but we need to keep it up and we need to, um, you know, encourage our entrepreneurs to think really big. And think about very, very large scale problems because we have the R&D here, we have the, you know, dedication, um, you know, it's the lessons around scaling and persistence. I think we could learn a lot from, from our, from our neighbors down South.

[Music transition]

You know, I would love Shopify to acquire smaller Canadian companies and then have those entrepreneurs help them build a Shopify further and then go and build their own, companies after that. Right. You know, of course, you know, like all Canadians, I was watching the [Element AI](#) story very closely, and on one level, it saddened me to see that such Canadian talent is now going to be in service of an American company, but that's also the darwinian nature of the market. Like if you're going to raise that amount of money and you're going to, you're going to be, you're

going to have to show success. And, you know, I think sometimes we, I think we also are harder on our failures here. Um, whereas in the States, you know, a company like that fails every month, if not further.

[Music transition]

Thierry Harris : Yeah. Yeah. And also these are teachable moments, you know, if we, if we take a look at the Element AI case from end to end from its initial kind of ideation into what it turned into and the impact that it had, certainly in Montreal on the AI ecosystem. I mean, there's a lot of good things that came out of Element AI.

Sheldon Fernandez: Absolutely

Thierry Harris: And you're rightly saying that, you know, commercial endeavor is not the last thing in, you know, it's not the last period of the book that we're writing in our lives here.

[Music transition]

Sheldon Fernandez : Yeah, no, and, you know, there is a certain amount of sympathy I have for any business owner, because it's hard, it's very, very hard to take any business to a, turn it into a vision to raise money, to commercialize it. It's very, very difficult to do. And even in failure, there's so much to be learned and, um, you know, the, the room the vibrating effects of an endeavor like that will have a lot of positive impact. So, you know, as you said, it's a teachable moment for entrepreneurs in general, but certainly for us here in Canada.

[Music transition]

Thierry Harris: Sheldon perhaps you are, I would qualify as an industry veteran. I think also we should definitely, take a moment to acknowledge all the work that you've done in helping to build the Waterloo innovation ecosystem. You know, you founded a couple of companies and now you're working as a CEO, at Darwin. You have great insights into the industry and, uh, we'll have some links on our webpage to a lot of the talks that you've given in the past, both for academia and some of your industry pitches. Perhaps you can give us a bit of context for our audience, which is students who are at business schools, people who are interested in commercializing technology, how is AI doing today, uh, where we're at, where are we at and where are we going with it?

[Music transition]

Sheldon Fernandez: What a great question. So I mean, I actually often use an analogy and it's funny, cause I'm talking to you from my parents' house. I bring my son here and they take care of him three days a week. And I'm actually in the basement where I spent the majority of time on my 386 computer as a teenager.

And I sometimes make the analogy that we're at a, the AI is at a place where the internet was in the early to mid 1990s. And so back then, for those of you listening that, remember this, you know, we didn't have the internet, we had these modems that, you know, connected you with people around the world over telephone wires. And it was just interesting and fun and nice to be a part of that community. I don't think we, we thought then that these little, you know, ones and zeros flying over telephone wires would blossom into the digitized world we have today would destroy industries, create industries and so forth.

And when I look at artificial intelligence now, it's just like, you know, in my opinion, what we had with the internet in the mid 1990s, like people are just grasping its capabilities. Companies are just realizing that they need to incorporate AI into their business models and make it a part of their business. And it's extremely exciting. It's a bit disorienting given all the hype you'll read about and all the different machinery we have to play with with artificial intelligence.

But it's something that's here to stay. And just like I would have recommended to an MBA student in 1995, Hey, pay attention to the internet. I, you know, offer the same mantra to undergraduate students and to business students to pay attention to artificial intelligence because it is already having a significant impact on many industries and it's going to continue to do so.

[Music transition]

Thierry Harris: Definitely. And also there's a monopolization element from big tech that comes into, you know, we have one search engine right now. We have one social media network. We have one, kind of behemoth, Amazon, where we're buying and selling everything and what happens to everybody else?

And, you know, you're saying that AI is at the stage where we were in the nineties, kind of the wild, wild West of the internet back in the day. And it's funny, you know, I don't, I wonder if we take a look back, what was the element that kind of capitalized that market to allow kind of the Google, YouTube was one of them which Google ended up buying, uh, you know, Facebook and bought a bunch of stuff. Apple bought a bunch of stuff on Amazon just, you know, went from an online bookseller to, you know, the market of the world over here.

And is that a good thing? I mean, look at where we are now in society and the impacts of what, you know, some of these algorithms are having in promoting... you know, we've seen what happened with our neighbors down South and what's going on over there.

And in other countries, you know, everywhere from Burma to the Ukraine, you know, and you've had some talks a little bit about ethics regarding the development of AI.

Perhaps we can take a few minutes for you to give your ideas about this very important question, because, you know, we are all about commercialization, but,, as one of our predecessors [Suzanne Grant](#), was saying from the [Canadian Advanced Technology Alliance](#), we have to develop a tech technology for humans, for the benefit of humans, you know, not just to take advantage of a market opportunity to, you know, score a big win on the stock market or something like that. Maybe you can go into a little bit about what your thoughts are on the ethics relating to AI, and if there's been an evolution in this discussion in some of what you've been hearing over there.

[Music transition]

Sheldon Fernandez: Yes, that is a fantastic question. The first thing I want to address though, is this question of these very, very large companies and the impact that they have and, you know, the way we think about them.

I actually remember in the nineties, um, when it looked like [Microsoft](#) was going to be the juggernaut in the computing industry for the next 50 years, because they had windows, they had the desktop, they had office and [Bill Gates](#) was asked, you know: "What's your advice, young entrepreneurs on how to compete with you and how to build successful companies?"

And he gave what I thought was a very intelligent answer. He said: "Well, guys, I don't know, because if I knew what the next big thing was, I'd do it right now at Microsoft."

And sure enough, if you look at how, you know, yes, Microsoft is still Microsoft today, but you know, there, there, there are the [Amazons](#) and there are [Google's](#), as you said, who are, you know, alongside them it's because Microsoft was late to the internet and they didn't quite pick up on mobile and so forth.

And so, you know, it looks in, in a, in a static way, like these companies are going to be the Goliath forever, but the nature of innovation is such that, you know, some somewhere, somehow though there'll be a player that will threat threatened that dominance. And that's, you know, the beauty of the capitalistic system, that we shouldn't forget.

[Music transition]

Now that said the, from an ethical perspective, the big challenge with big tech is it is ubiquitous in our lives. And we don't think about the, the capitalistic for profit impulse at the heart of it. Right? So I remember reading a pretty technical article, maybe four months ago about YouTube video recommendation and they say, how often do we fall down the YouTube rabbit hole, where you're watching a video, then there's a recommendation you're watching that video.

You're watching that video. And what they learned, um, was that YouTube intent of serving you up videos is to maximize the amount of time you spend on YouTube so they can serve you more advertising. That's why the service exists.

But to your point, if you look at the ubiquity of these systems, of course, the misinformation in the recent Presidential election, what's happening in the end, Myanmar, in Russia, in Bangladesh, there are real questions about the regulatory impact, of the systems and what needs to be done.

And I think we are very aware of these problems now, especially in relation to politics and misinformation, the question is what you do about it? And I think that is going to play out from a policy perspective in a very significant way in the next 10 or 15 years. Because look, this is what, you know, I have a son who's two who doesn't really know what an iPad is yet, but he will in a year. And the thought of, you know, content that is being served up to him in a way I don't quite understand is very disconcerting as a parent. And of course I have, you know, friends whose, whose kids are now 13 and 12 and social media and its impacts, particularly on adolescent females has been well-documented. So we do need to really start asking some intelligent questions about the ethics of these systems. And I think you're going to start to see it.

[Music transition]

Thierry Harris: Well, we'll have some interviews down the pike with some folks who are going to be able to articulate that very topic on Market Hunt. And so stay tuned on that one, because it is an important question.

One interesting thing, though, just getting back to the comparison of the big, the [GAFAMs](#), and where they were at, you know, it's funny if you look at the evolution of the technology companies, you know, basically starting with IBM, you know, maybe came about in [a sort of military defense application](#), which was then turned into a consumer product, which then, you know, [IBM](#) was making computers, consumer [computers at one point](#), I believe. And if you take a look at Microsoft now in the nineties where they were really their power juggernaut was the, was the [Windows application software](#). Microsoft is a tremendously different company from one, we all kind of remember it when it was a top dog back in the nineties.

And right now it's doing fantastic things, you know, in the [AI sphere](#) in, many different spheres that are much more sort of like you being in the basement, you know, working away, they're not necessarily the big, sexy things that are happening, but my goodness are they important in terms of working on the right problems and seeing how, you know, the Googles of today, and the [Facebooks](#) of today, you know, in terms of turning these platforms and, and [making them more of a utility](#) as their technological advantage, expires so to speak, it's going to be interesting to see who the new players are that come about from the generation of millennials that are going to be leading these companies and how these millennials that have sort of been ingrained with things like cancel culture or more social responsibility.

You know, the biggest climate activist is a, you know, not able to vote even, uh, you know, when we're thinking about [Greta Thurnberg](#) over here.

So, you know, it's going to be interesting to see how they embrace capitalism, and if the new companies that come out, obviously, you know, the dollar is a very attractive thing to chase, but people have been talking about AI and its impact on work and potentially, you know, the idea of [universal income](#), which was tested out in Canada, close to where you are, I believe in [Hamilton](#).

What do you think are some [of the roadblocks to AI adoption](#)? And how do you think it's going to transform, uh, commerce as we know it?

[Music transition]

Sheldon Fernandez : Yeah. What a great question. I mean, in the short term, there are many technical challenges to adopting AI. There are the ethical questions of [data bias](#), right? And, and ensuring that the system is fair across [genders](#), across [ethnicities](#), [sexual orientation](#), really any protected class. And those are difficult problems to solve when you're teaching machine to infer its behavior based on data. There's getting data, data, you know, as they say, in, in many, uh, companies like the new oil, um, you know, large companies that have it, don't want to share it with startups for, for good reason, that's their trade secret, but they don't have the technical technical expertise to build these systems. So many of them are in a period of stasis. So those are, those are, you know, significant problems at a technical level that, that we need to tackle.

I don't think the adoption of AI beyond those things will have real philosophical pushback, because it is such a powerful utility in so many different sectors where it's going to become a situation where if you don't adopt it, just like if you were in the company, a company in the 1990s, and didn't think about the internet in your business strategy, you were destined for obsolescence.

You know, that that is what is going to happen. And many of the clients we work with are, are motivated by fear are motivated by the recognition that if they don't adopt an innovative agenda around these technologies, their competitor, you know, across the street across the world will very quickly leapfrog them.

Now that said you raise fascinating questions about millennials and the dimensions they will bring to this conversation. You know, I, I think about myself at 25 and the idealism that I had and you know, how that idealism has changed, being older, obviously being a father, but I hope that the next wave of entrepreneurs are not jaded by my generation and, you know, my parents' generation and really try to enact real change cause we need it.

If anything, what we're learning with COVID and these systems is it makes the [economic inequality is more pronounced in our world](#). So I really hope that they can, a lot of these, you know, progressive values of fairness and climate change and so

forth, more central. And you're, you're seeing that you're seeing that certainly with Greta, as you mentioned, you're seeing that with the new administration in the United States, So there is hope. Um, but it's, it's a very, very complex question with just so many moving parts. And I think part of me at the retired Sheldon at 60 or 65 or whatever it is, we'll, we'll look in all at the next generation and hopefully applaud.

[music transition]

Thierry Harris: Well, you know, it's, it's amazing because we're watching history unfold literally in, in, in our palm, in the palms of our hands. You know, as we see [people storming the Capitol](#) and we see the [impacts of misinformation](#) that's coming out there and there's a lot of people, as you said, are missing out on the benefits of this technology, and it's country like Canada, which is, you know, geographically, I think in the top three in the world. And [a lot of places don't even have high speed internet right now](#).

So you could imagine what the progression, uh, that needs to take place, to get our country, uh, you know, to a level of technology adoption as you would in South Korea or a Singapore, or maybe some countries in Europe, but to Canada still has a long way to go on that.

That's a conversation for another day, let's get back to Darwin, AI. What are some of the interesting projects that you're working on today and how do you see, uh, Darwin AI evolving into the future? You know, you're a four year company, you've eliminated the word startup from your intro. Tell us a little bit about why you did that and then where you're at now and where you're looking to be in the future.

Sheldon Fernandez : Yeah. Great question. Um, well, number one, I think, you know, growing up, you know, you, you're, you're reaching a certain level of seriousness where, um, you know, it's, it's time to grow up a little bit. And I think that's why we, I certainly don't like to describe this as a startup anymore.

But I think what's really exciting for me is, you know, we spent years developing this core capability and what we realized was we needed to hone in on some specific offerings in specific verticals that were high valued use cases to our clients. And so two of the areas are [manufacturing](#). That's a big one for us. When we looked across our aerospace clients and industrial clients, the ability of deep learning to, you know, do things like anomaly detection, parts inspection was really, really powerful. And so we're developing a particular particular capabilities around that. And by virtue of our work in COVID-net, we're also really, foraying, uh, quite committedly into [healthcare](#) and pharma. One of the great things about COVID-net, you know, first of all, you know, it's being used in hospitals around the world, but it really was a very topical illustration of our technology, which got the attention of a lot of healthcare majors and pharma companies. And so that's a real area of opportunity for us that I'm quite excited about.

[music transition]

Thierry Harris: Well, that's amazing. The beauty of it is that with the power of machines, we can let the machines do the sort of hard number crunching that a human could never even imagine to do themselves. And we can focus on just asking the right questions and if we ask the right questions and if we are ambitious enough, and if we are bold enough and courageous enough to ask those hard questions then potentially we could get machines to help us solve problems that have been happening for a long period of time that we thought were insolvable, and we can go ahead and tackle them and make those useful in a way.

[music transition]

So moving forward, looking at your technological advantage that you have with your platform, how are you planning to maintain that technological advantage? Is it something that you're concerned about?

[music transition]

Sheldon Fernandez: I probably should be, but I am fortunate enough to have just an incredibly talented team of academics who, you know, consistently and relentlessly innovate around artificial intelligence. I actually feel the pressure as the businessperson to really figure out where we can apply their innovation and maximize it. And so that's really what I see as the big challenge,

[music transition]

There are entrepreneurs, you know, say to me: "You know, Sheldon, you're, you're sitting on a full house, like you need to cash in on this. Not all of us have access to [Canada's research chair in artificial intelligence](#)."

So for me, it's very much about, okay, we have this incredible technology, these are the areas where we're getting traction. How do I accelerate that traction? Who do I partner with? Where do I spend time? What opportunities do you turn down? That's also one of the most important things that an entrepreneur will do, because things can seem lucrative. They can seem exciting, but they can be dead ends. So that's, that's a lot of what keeps me up at night, is you know, where, where we spend time with this very interesting technology we have.

[music transition]

Thierry Harris: A lot of folks who are listening to these shows are students that are looking to say, "Hey, okay, well, I'm going to do my PhD study or my master's thesis. And I'm going to take a company who's at your stage of commercialization." They might even take your company period, and study it and analyze it. So if you had access to these great minds sort of taking a look at Darwin AI and exploring what options, you know, Darwin AI could do in the future, I'm sure there's not as many as [a game such as Go](#), which you talked about in then other chat. But, what kinds of

things would you like students to look at from a business perspective? What kind of questions would you like them to be working on?

Sheldon Fernandez: Great question. I would say, you know, if they could understand deep learning at a, at a, at a, you know, a certain level, you know, they don't have to be machine learning specialists or whatever, but understand what it's capable of. And there are so many obscure esoteric industries or use cases that are high value, but nobody has thought about applying artificial intelligence to, I would love for folks to start thinking about that.

As an example, you know, one of the portfolio companies that one of our board members sits on, uh, she did her, her masters, uh, thesis in using computer vision to detect shrimp. And it was purely a thesis out of interest. And then she realized that the shrimp market in Asia and across the world was in the billions tens of billions. So she turned that into a company that's now using deep learning to the tech, the health of shrimp when, when people fish for shrimp.

[Begin end music]

And so I think, you know, having as many minds in Canada as we can, that are understanding this machinery, let's call it second, wave AI, machine learning, and then searching for those industries that don't get a lot of attention that aren't on the front page of Wired and Infoworld and the New York times. I think there there's real value in that, not just for Darwin, but for Canadian entrepreneurship in general.

It's great to analyze, it's great to read all the books and so forth. There's nothing as intoxicating as actually just doing it. And it's not for everybody, not everybody's an entrepreneur or wants to be an entrepreneur. I completely respect that.

But the amount that you learn running your own enterprise, even if you fail, you'll win, because you will learn tenfold, then if you work for somebody else. So I do hope at least, you know, let's say five to 10% of your listeners at some point are inspired to just go and create companies and do great things for our country.

Thierry Harris: Well, I think that we can't top that last answer, so let's leave it at that. Thank you so much Shelton Fernandez. Is there anything else you would like to add?

Sheldon Fernandez: You know, I'll, I'll add one more thing. I don't want... I often get asked, well, you know, what's, what's the thing that really excites you about AI, right. and I actually, many moons ago, did a theology degree. And the question of consciousness for me is, is a fascinating one, right? Because we don't understand the science of the brain and what gives rise to consciousness. And the, the question that some people ask is, will we ever see artificial consciousness? That is a question I don't think will be answered in my lifetime, but given all the progress that we've seen with machine learning, I wonder if it might be answered in my son's lifetime.

Thierry Harris: That's all the time we have for today folks. For more on the ideas and concepts presented in this show, be sure to check out the episode research links on the episode show page. You might find yourself going down the Knowledge Hub rabbit hole, and we hope you will enjoy the ride.

Narrator: And now a final word from our sponsor, the IE-KnowledgeHub.

IE-Knowledge Hub is a website dedicated to promoting learning and exchanges on international entrepreneurship.

If you are an education professional looking for course content, an academic researcher seeking research material, or someone interested in business innovation check out IE-Knowledge Hub.

Let's pickup where we left off for Cogiscan, a company connecting machines and software on the manufacturing floor to track, trace and control electronic components in circuit boards.

François Monette: Every equipment vendor in the industry today is selling his machine, and they all have a different software system, and they all say 'hey, I want your machine to talk to my software.' Then the next guy says I want your machine to talk to this software which is different. So this equipment vendor has to develop and support all kinds of different interfaces to all kinds of different 10 software systems.

Narrator: That's [François Monette](#) explaining the problems his target customers have when purchasing machinery and software needed to create electronic circuit boards. He elaborates:

François Monette: It's not their core business, they don't like to do that. If we can come in and say, you know we can give you a one stop shop, you know, we will do that interconnectivity for you. So your machine will be able to plug and play with any software. and there is a real need for that.

Narrator: After over twenty years in business, Cogiscan's strong emphasis on building partnerships and acting as a connector is paying off.

Vincent Dubois: What we do, we do the best in the industry. We make these equipments connected assets. Everybody will want to go towards that, because that's what makes sense. You know the factory of the future basically. In our wildest dreams you know every equipment manufacturer would work with us so we can connect to every type of equipments, and I mean we are not that far, I mean the major equipment manufacturers we already connect to and we already have a relationship with them. And again it goes back to, do you have the technology is

fine, but are you able to create these partnerships? Because we are dealing with humans at the end of the day.

Narrator: *You've been listening to segments of the Cogiscan video case study. To learn more about electronics manufacturing, watch their full case available for free at ie-knowledgehub.ca.*

[Begin credits music]

Thierry Harris: Market Hunt is produced by Cartouche Media in collaboration with [Seratone Studios](#) in Montreal and [Pop Up Podcasting](#) in Ottawa. Market Hunt is part of the IE Knowledge Hub network. Funding for this program comes from the [Social Sciences and Humanities Resource Council of Canada](#). Executive producers [Hamid Etemad](#), McGill University, Desautels Faculty of Management and [Hamed Motaghi](#), Université du Québec en Outaouais. Associate producer Jose Orlando Montes, Université du Québec à Montréal. Technical producers Simon Petraki, Seratone Studio and Lisa Querido, Pop up Podcasting. Show consultant JP Davidson. Artwork by Melissa Gendron. Voiceover: [Katie Harrington](#). You can check out the IE-Knowledge Hub case studies at [ie hyphen knowledge Hub dot ca](http://ie-hyphen-knowledge-hub-dot-ca). For Market Hunt, I'm Thierry Harris, thanks for listening.